

ART 34 AMDT

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TARGET SYSTEM

The present invention relates to a target system provided with a pop-up target as defined in the preamble of claim 1.

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Target systems with pop-up targets designed for light infantry weapons comprise a metallic target, which falls down when hit by a bullet, and an actuating mechanism for actuating the target, i.e. for lifting it up again and moving it. The actuating mechanism may be protected by a shield plate placed in front of it. To control the actuating mechanism, a control apparatus provided with a computer may be connected to the actuating mechanism. Hits can be detected e.g. by using a hit detector arranged in conjunction with the target.

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The actuating mechanism may be electrically operated, but it may also be operated pneumatically. A drawback with pneumatic target systems is their large size, which means that moving them e.g. for transportation requires transport equipment, and in addition, they often have to be immovably installed. Moreover, in connection with relocation of pneumatic systems, e.g. the pneumatic hoses and protection against fragments have to be renewed.

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An electrically operated target system provided with a pop-up target is disclosed in US patent specification 4,732,394. The system described in this specification comprises a vertical protective flange on the front side and another, horizontal flange behind it. The target is hinged at the upper edge of the vertical flange, and when hit by a bullet, it swings backwards into a horizontal rest position. A main shaft driven by an electric motor is mounted behind the protective flange. Mounted with a clutch mechanism on this shaft is a target raising arm, which, when the target is in the backward position, swings from its rest position upwardly and turns the target to an upright position.

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The system disclosed in the above US patent specification is relatively complicated. Moreover, it is relatively weak in construction e.g. because of the welded joints used in the target, so it will easily break and therefore does not tolerate hard use.

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US-A-4,979,752 discloses a target range apparatus for rifle and handgun targets having a knock-down target supported on a target base moveable on a

ART 34 AMDT

support frame between an upper, exposed position and a lower, hidden position. The target is pivotally attached to the target frame for movement between an upright position and a knock-down position. An air cylinder moves the target base upwardly against a pair of springs which, when the air cylinder is disabled, return the target base to the lower position. A reed switch senses movement of the target to the knock-down position and disables the air cylinder. Upon movement of the target base to the lower position, a reset arm returns the target to its upright position. The apparatus further includes a support frame embedded in the ground and a target base on which is pivotally mounted a target that in the preferred embodiment is an animal silhouette.

The problem of the prior art as shown in US-A-4,979,752 is the heavy and bulky construction of the apparatus, especially as the actuating means include an air cylinder and springs.

The object of the present invention is to overcome the drawbacks of prior art and to achieve a new type of target system provided with a pop-up target and actuated by an electric motor, which system is of very durable design and is additionally of modular construction.

In the target system of the invention, the target is attached to a carriage which moves on upright guide rails and is driven by an electrically-operated actuating mechanism. When the carriage is driven up, the target is in an upright position and visible to the shooter. When the shooter hits the target, it falls down and disappears from view. The electric motor draws the carriage down, with the result that the target hits a lifter and rises to an upright position again. The carriage remains in the low position hidden behind a protective armour, ready to raise the target again.

The features of the target system of the invention are presented in detail in the claims below.

The target system of the invention is very simple and durable, especially because welded joints have been eliminated from the parts subject to stress, thus achieving a durable construction. In addition, the target system of the invention is of light weight, so it can be portable, and no special transport equipment is needed for relocation of the target system. Thanks to the modular

ART 34 AMDT

construction, individual parts are of light weight, typically below 20 kg, and e.g. broken or worn parts can be replaced in a rapid and simple manner. Thus, if necessary, a single person can move, assemble and disassemble the target system.

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Moreover, the target system of the invention makes it possible to implement a reactive and relocatable target system that can be used e.g. with a large variety of portable-firearm calibers.

10 In the following, the invention will be described in detail with reference to and example and the attached drawings, wherein

Fig. 1a presents an oblique rear view of a target system according to the invention,

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Fig. 1b a front view of a target system according to the invention without front armour, and

Fig. 2a – 2d present a target system according to the invention in different positions.

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The target system presented in Fig. 1a and 1b consists of five main components: a target 3, a carriage 2, guide rails 6, an electric motor 1 with levers 4, 5 and a frame 7. The operation of the system is controlled by a control unit (not shown) provided with a computer. The target 3 is a steel plate impenetrable to a bullet.

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The motor 1 located in the lower part of the apparatus moves the carriage 2 along a pair of vertical guide rails 6 by means of levers 4, 5 connected to it. The target 3 is hinged at its lower end on the carriage by horizontal shaft 8 provided in the carriage and a transverse horizontal hole in the lower edge of the target. The levers 4, 5 are connected to the rotating axle 10 of the motor 1 and to a pivot pin 11 at the lower edge of the carriage. In addition, the levers are connected to each other by a pivot pin 12. The motor 1 and the guide rails guiding the carriage may be fixedly mounted on the frame 7.

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In position A (Fig. 2a), the carriage 2 is in its low position and the target 3 in an upright position but hidden behind a front armour 15. The carriage 2 is raised up by the motor 1, thus bringing the target to position B (Fig. 2b) so that it can be shot at. If the target 3 is not hit, then it is lowered along with the carriage 2 back to position A. If the target 3 is hit, then it falls down to position C (Fig. 2c), where it is supported by a support part 13. The overturning is registered by a sensor connected to the control unit.

When the carriage 2 is lowered to position D (Fig. 2d), the target 3 hits a lifter 14, which, powered by the motion of the carriage and the inertia of the target, returns the target 3 to an upright position, and when the carriage 2 reaches the low position, the system is again in position A. The length of the rails 6 is so chosen that, in position A, the target 3 is completely hidden behind the front armour 15.

The support part 13 and the lifter may be solid or flexible. The support part 13 is located in a position where the translation and rotation of the target 3 are simultaneously cancelled out. The functions of the support part 13 and the lifter 14 can also be integrated in a single component.

In the high position, the target is not strictly upright but slightly forward inclined. This is a stable position and the target can not be overturned e.g. by the wind.

As described above, the target system implements the following three functions: target emerging into view, target disappearing from view, and immediate feedback from a hit as target is overturned or the like.

The system consists of distinct modules that can be replaced with new ones when necessary. The target 3 may also consist of two parts 16, 17 attached to each other e.g. with bolts 19, of which parts the upper one is a target part 16 and the lower one a mounting part 17, which has a slot 18 in its upper edge for the target part and in its lower edge a hole 9 for a shaft 8 as mentioned above.

The motor 1 used as a power means can be easily carried along and, when necessary, a likewise portable accumulator can be used a power source.

9-01-2004

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ART 34 AMDT

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It is obvious to the person skilled in the art that different embodiments of the invention are not limited to the example described above, but that they may be varied within the scope of the claims presented below. The electric motor may also be a linear motor, in which case no lever arms are needed.

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AMENDED SHEET

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